Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band	))))	GN Docket No. 12-354

COMMENTS OF THE UTILITIES TELECOM COUNCIL, THE EDISON ELECTRIC INSTITUTE AND THE NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

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As more fully described herein, UTC, EEI and NRECA support the Commission's initiative to make 100 MHz of spectrum available for a Citizens Broadband Service at 3550-3650 MHz for small cells and spectrum sharing, including a Priority Access tier for mission critical communications. Utilities and other critical infrastructure industry entities should be made eligible for access to the Priority Access tier. This will help to provide access to broadband spectrum that is needed for smart grid and other applications, including emergency response communications.

There should be a multi-tier framework that includes a GAA tier as well as a Priority Access and Incumbent Access tier, and the Priority Access tier should be in the lower half of the band and the GAA tier should be in the upper half. The Commission should also adopt a license by rule model for the bands, which will facilitate deployment. The Commission should combine the 3650-3700 MHz band with the 3550-3650 MHz band to enable access to up to 150 MHz of spectrum for small cell spectrum sharing. Finally, the entire 150 MHz of spectrum should be subject to the Spectrum Access System (SAS) database, and the information on the database should be treated as classified and confidential, particularly considering that the information on the database will likely include data on Federal government operations and critical infrastructure operations.

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Pursuant to Section 1.405 of the Commission's Rules, the Utilities Telecom Council ("UTC"), the Edison Electric Institute ("EEI") and the National Rural Electric Cooperative Association ("NRECA") (collectively, "the Associations") hereby file the following comments in response to the Commission's Notice of Proposed Rulemaking and Order in the above-referenced matter.[1]

UTC supports the Commission's proposal to allocate 100 MHz of spectrum for a Citizens Broadband Service at 3550-3650 MHz (the 3.65 GHz Band) for spectrum sharing and small cell use to provide fixed and mobile broadband services, including a Priority Access tier designated for small cell use by certain critical, quality-of-service dependent users at specific, targeted locations.[2] As the Commission is well aware, utilities rely on mission critical communications to support the safe, reliable and efficient delivery of essential electric, gas and water services to the public at large. Hence, the Associations agree with the Commission that utilities should be included among those that would be eligible to access the 3.5 GHz Band in the Priority Access

[1] *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band* Notice of Proposed Rulemaking and Order, GN Docket No. 12-354, 2012 WL 6463547 (Dec. 12. 2012).

[2] *Id.* at ¶9.

tier.[3] The Associations also agree with the Commission that "the availability of the Priority Access tier could bring the benefits of mass-market commercial scale to specialized uses and provide a new alternative to dedicated spectrum, which is in short supply."[4] Finally, the Associations agree that the "combination of geographic separation and database management could provide Priority Access users with adequate assurance of a consistent high quality service environment."[5]

In addition, the Associations also support the Commission's proposals for a multi-tiered, license-by-rule licensing framework for the band, and the establishment of a Spectrum Access System (SAS) database that would manage spectrum resources and mitigate interference between all users in the 3.5 GHz Band.[6] Under the Commission's proposed multi-tiered framework, a General Authorized Access (GAA) tier and an Incumbent Access tier would also be created in which Incumbent Access users would have protection from harmful interference from all other users in the 3.5 GHz Band; and GAA users would be required to accept interference from Incumbent and Priority Access tier users and would be required to avoid causing harmful interference to any users in those tiers.[7] Priority Access tier users would be in fixed locations, and would rely on the SAS to enforce their right to use a portion of the 3.5 GHz Band at a specific location on a protected basis.[8] Priority Access operations would be permitted only in geographic areas where Citizens Broadband operations would not interfere with incumbent radar and fixed satellite operations and, because they would have a quality-of-service expectation.[9] Priority

[3] *Id*.

[4] *Id.* at ¶9.

[5] *Id.* at ¶70.

[6] *Id.* at ¶95.

[7] *Id.* at ¶¶54, 56.

[8] *Id.* at ¶101.

[9] *Id*. at ¶70.

Access users would be required to register in the SAS, employ appropriate mitigation techniques, and otherwise take all necessary steps to avoid causing harmful interference to incumbent operations.[10] Finally, all of the operations in the 3.5 GHz Band would be licensed by rule, which would provide licensees with flexibility to deploy small cells in the 3.5 GHz Band on a cost effective and timely basis, subject to the condition that they register. As more fully described below, the Associations support these proposals.

The Associations also support the Commission's proposal to combine the 3.5 GHz Band with the 3650-3700 MHz Band (3.65 GHz Band). As the Commission notes, the 3.65 GHz Band is providing a variety of important services to utility companies, public safety entities, businesses, and consumers.[11] By combining the 3.5 GHz Band with the 3.65 GHz Band, it would make available 150 MHz of spectrum for additional licensing flexibility and capacity. The Associations support the Commission's proposal to adopt a license-by-rule, SAS database approach for the combined band. This would create an opportunity to clean up the 3.65 Band, which is lightly-licensed and which is only subject to the condition that licensees register their operations in a database. As such, the Associations support the Commission's proposal to combine the 3.5 GHz Band with the 3.65 GHz Band.

While there is some merit to some of the alternative licensing and spectrum access models, the Associations believe that the Commission's proposals represent a balanced approach that should provide access to spectrum that is sufficient and reliable for utilities and other critical infrastructure industries, as well as for Federal government and commercial broadband service providers. While a two-tiered framework composed of an Incumbent Access tier and a Priority Access tier would potentially provide more spectrum for use by Priority Access users, such as

[10] *Id.*

[11] *Id.* at ¶77.

utilities; it would negate some of the public interest benefits associated with including a GAA tier, including promoting spectrum efficiency and fostering an equipment ecosystem.[12] Similarly, while a geographic area licensing framework would provide protected service areas, it would introduce costs and delays that would likely harm the public interest.[13] Finally, other licensing frameworks such as lightly-licensed or unlicensed frameworks would not provide the same protection against interference, which is so important, especially for utilities and other critical infrastructure industries.

The Associations support the Commission's technical proposals for the 3.5 GHz Band. Specifically, the Associations support the creation of the SAS database, incorporating the information and design criteria as more fully described below. Because the database will include classified information and information that could be considered "Critical Infrastructure Information" under the Homeland Security Act, the information database should be secure and restricted from public disclosure. For similar reasons, the Associations agree that there is a role for government in administering the database, although the Associations believe that the database should be primarily administered by third party private entities. Last but not least, the Commission should take steps to adopt technical rules for the protection of incumbent users that maximizes the use of the band by Priority Access users, accounting for the use of the band by small cells. In that regard, the Associations agree that small cell use should dramatically reduce the size of the exclusion zone recommended in the PCAST report.

With regard to technical specifications for Priority Access and GAA devices, the Associations support the Commission's proposed power limits and antenna gain parameters. The Associations also support an out-of-band emission limit that is consistent with the 43+10log

[12] *Id.* at ¶84.

[13] *Id.* at ¶85.

P dB OOBE limits that apply to equipment in the 3.65 GHz band. The Associations support applying the existing RF exposure limits to small cell 3.5 GHz Band operations, and they believe that the Commission should streamline compliance with environmental requirements for 3.5 GHz small cells. Finally, the Associations agree that 3.5 GHz Band equipment should be authorized by the Commission in order to ensure compliance with the Commission's technical rules.

In addition to rules regarding the technical characteristics of small cells, the Commission has also invited comment on other technical issues with regard to band segmentation and access coordination and other interference mitigation techniques. In that regard, the Associations believe that the 100 MHz should be divided between Priority Access and GAA, and that Priority Access should occupy the 3550-3600 MHz band on a nationwide basis. The Associations believe that the same rules should apply to both bands. While band segmentation may not be the most spectrally efficient approach, it is appropriate in light of the need to protect Priority Access users against interference and congestion, as a practical matter. With regard to some of the interference mitigation techniques considered by the Commission, the Associations support the concept of using spectrum sensing technologies, particularly those that are currently being used in the 5.4 GHz band to protect against interference to or from radar operations. Finally, the Associations oppose restricting operations to indoor only, because it would prevent utilities and other CII from using the 3.5 GHz Band for most if not all of their potential smart grid and other applications, including emergency response communications.

I. Introduction

UTC is an international trade association for the telecommunications and information technology interests of utilities and other critical infrastructure industries. Its members own,

manage and control extensive communications networks that they use to support the safe, reliable and efficient delivery of essential electric, gas and water services to the public at large. These members include large investor-owned utilities that may serve millions of customers across multi-state service territories, as well as smaller rural electric cooperative utilities or municipal utilities that serve only a few thousand customers in isolated communities or remote regions of the country.

EEI is an association of U.S. investor-owned electric utilities and industry associates worldwide. EEI members serve approximately 70 percent of all U.S. electricity customers, and generate about 70 percent of all electricity delivered in the United States. EEI frequently represents its U.S. members before federal agencies, courts and Congress, and it has filed comments before the Commission in numerous proceedings affecting the interests of its members.

NRECA is the national service organization for more than 900 not-for-profit rural electric utilities that provide electric energy to approximately 42 million people in 47 states or 12 percent of electric customers. In addition to 840 distribution cooperatives, NRECA's members also include approximately 65 Generation and Transmission ("G&T") cooperatives.2 Sales by rural electric cooperatives account for approximately 11 percent of all electric energy sold in the United States. Rural electric cooperatives were formed to provide reliable electric service to their owner members at the lowest reasonable cost. Rural electric cooperatives are dedicated to improving the communities in which they serve. Management and staff of rural electric cooperatives are active in rural economic development efforts. NRECA's members rely on a mix of wireless and wireline telecommunications services to support and maintain their rural electric distribution systems. Rural electric cooperatives depend on robust telecommunications

infrastructure and services to support their smart grid and other operational applications and, in some cases, to offer broadband services to their members in order to support their commitment to spur economic development in the communities in which they serve.

Utilities and other critical infrastructure industry entities are initiating smart grid and other applications that require additional communications capabilities. Networks need increased capacity and coverage to support greater visibility further into the grid, water works or pipeline. For some applications, latency needs to be exceptionally low. Moreover, reliability and resiliency of the network needs to be exceptionally high, so that communications are maintained, especially during emergencies such as power outages.

In order to meet their increasing communications demands, utilities need access to additional spectrum that supports the capacity and coverage and other requirements that utilities must meet. Utilities and other critical infrastructure industry entities do not currently have access to suitable spectrum to meet the demands from smart grid and other applications. Land mobile spectrum that they use is narrowband and subject to interference and congestion. Microwave spectrum has been reallocated for commercial services and utilities have been relocated to higher frequency bands. Unlicensed spectrum is subject to power limitations and interference, reducing its coverage and reliability. Hence, utilities need access to spectrum that provides the capability for wideband fixed and mobile applications to provide additional wide-area coverage and backhaul.

As the Commission is aware, the Associations and others have been advocating for access to spectrum for utilities and other critical infrastructure industries in a variety of different proceedings.[14] In response, the Commission recommended in the National Broadband Plan that

[14] *See e.g.* AEP Comments in response to the Commission's Public Notice #2 in the National Broadband Plan proceeding (hereinafter NBP PN#2), GN Docket No. 09-51, filed Oct. 2, 2009; Centerpoint Comments in re NBP

the National Telecommunications and Information Administration (NTIA) and the FCC should continue their joint efforts to identify new uses for federal spectrum and should consider the requirements of the Smart Grid.[15] It explained that "[i]dentifying a nationwide band in which Smart Grid networks could operate would speed deployment of a standardized and interoperable broadband Smart Grid. Establishing a nationwide band would also promote vendor competition and lower equipment costs."[16] The 3.5 GHz Band could help to fulfill the recommendation for nationwide spectrum to meet utilities increasing communications needs for a standardized and interoperable Smart Grid, while also attracting investment and new market entry by equipment manufacturers to provide devices for this band.

The Associations have been actively engaged with NTIA and the Commerce Spectrum Management Advisory Committee to explore opportunities for utility access to spectrum, including spectrum sharing. In recognition that dedicated spectrum is in short supply,[17] UTC has been a proponent of spectrum sharing, and PCAST cited a spectrum sharing proposal by UTC as part of its report that recommended spectrum sharing in the 3.5 GHz Band.[18] UTC also filed comments at the Commission in response to its Public Notice on the NTIA Fast Track Report in

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PN #2, filed Oct. 2, 2009; UTC Comments in re NBP PN #2, filed Oct. 2, 2009; Edison Electric Institute in re NBP PN #2, filed Oct. 2, 2009.

[15] National Broadband Plan, Recommendation 12.5.

[16] *Id., citing* Comments of Sempra in re NBP PN #2, filed Oct. 2, 2009, at 15; Comments of AEP Comments in re NBP PN #2, filed Oct. 2, 2009; Centerpoint Comments in re NBP PN #2, filed Oct. 2, 2009; UTC Comments in re NBP PN #2, filed Oct. 2, 2009.

[17] *See* NPRM at ¶73 (stating that "dedicated spectrum is in short supply and it is unlikely that enough spectrum will be freed in the near future to meet the escalating needs of these critical users.")

[18] PCAST, Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth at 45 (rel. July 20, 2012)(PCAST Report)(stating that "[t]here appear to be a number of applications that are too local or too small to warrant dedicated spectrum, but which would benefit from or require some form of spectrum access protection. The Utilities Telecom Council (UTC) has made a proposal to use Federal spectrum for use for an electrical smart grid"), *available at* http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf

which it urged the Commission to enable utilities to share the 1800-1830 MHz band and other potential bands with Federal government users.[19] As such, the Associations are pleased to comment on the Commission's proposal to make the 3.5 GHz Band available for spectrum sharing, including a Priority Access tier that would be designed for mission critical communications by utilities, as well as other users with a need for high quality communications.

II. Multi-Tiered Framework

In the NPRM, the Commission proposes a multi-tiered framework composed of an Incumbent Access tier, a Priority Access tier, and a General Authorized Access tier. The Incumbent Access tier would consist solely of authorized federal and grandfathered licensed FSS 3.5 GHz Band users. These Incumbent Access users would be protected from harmful interference from Citizens Broadband Service users through appropriate regulatory and technical means. Citizens Broadband Service users would not be permitted to operate within geographically designated Incumbent Use Zones, which would encompass the geographic area where low-powered small cells could cause harmful interference to incumbent operations.[20] The Priority Access tier would consist of a portion of the 3.5 GHz Band designated for small cell use by certain critical, quality-of-service dependent users at specific, targeted locations. Specifically, Priority Access operations would only be permitted in geographic zones with no likelihood of harmful interference from Incumbent Access users and no expectation of harmful interference from Citizens Broadband Service users to Incumbent Access users. Priority Access users would be required to register in the SAS and accorded protection from interference from lower tier

[19] Comments of the Utilities Telecom Council in ET Docket No. 10-123 (filed Apr. 22, 2011), *visited at* http://apps.fcc.gov/ecfs/document/view?id=7021240898.

[20] NPRM at ¶8.

users and other Priority Access users within their local facilities.[21] The GAA tier would be assigned for use by the general public on an opportunistic, non-interfering basis within designated geographic areas, where small cell use would not interfere with incumbent operations, but where some interference from incumbent operations might be expected. GAA users would be required to register in the SAS and comply with all applicable technical, regulatory, and enforcement rules to ensure that GAA users avoid causing harmful interference to Incumbent Access and Priority Access users and always accept harmful interference from such users.[22]

The Associations support the Commission's proposed multi-tiered framework composed of an Incumbent Access tier, a Priority Access tier, and a GAA tier. In response to the questions posed by the Commission in the NPRM, the Associations believe that with respect to Federal radar interference into the Citizens Broadband Service that GAA operations should be permitted in areas where they can possibly receive interference from radars.[23] Moreover, the Associations also believe that "mission critical" operations should be permitted in the band, because the threat of interference to these operations can also be mitigated to protect mission critical communications from harmful interference from DoD radars.[24] As the Commission notes, there are many spectrum bands that are successfully shared between Federal and non-Federal users.[25]

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[21] *Id*. at ¶9.

[22] *Id*. at ¶10.

[23] *Id*. at ¶59. These GAA operations can implement spectrum sharing interference mitigation capabilities, such as sensing technologies, which would enable them to operate in areas where they might receive interference from Federal radar operations. As the Commission notes, those coastal areas where Federal radar operations require protection are home to about 60 percent of the nation's population, thus making it important that GAA users seeking to provide consumer services be able to operate in those areas.

[24] *Id*. The Priority Access tier operations could also rely on interference mitigation capabilities of the SAS and technologies such as spectrum sensing and signal beacons, as well as geographic separation and access rules administered by the Commission and NTIA, as recommended by PCAST. PCAST Report at 22-23.

[25] *Id*. at ¶60 (listing examples such as mobile services authorized by the FCC for ship stations, Family Radio Service, Wireless Medical Telemetry Service, unlicensed devices, and FCC licensed commercial services.)

Likewise, the Associations believe that the spectrum sharing technologies that are becoming available, coupled with the access rules the Commission has proposed, will enable successful sharing between Federal and non-Federal users in the 3.5 GHz Band.

III. Proposed Licensing Model and Other Tiers

A. A licensed by rule model for the 3.5 GHz Band is appropriate and consistent with Commission precedent and authority under Section 307 of the Communications Act.

The Associations agree with the FCC that the Citizens Broadband Service should be licensed by rule, and that the Commission has authority under Section 307 to define it as a Citizens Band Radio Service under Part 95.[26] Further, it would be consistent with Commission precedent to adopt a licensing by rule model for this band, because the Commission has adopted a license by rule model for the Wireless Medical Telemetry Service (WMTS). Like WMTS, the Citizens Broadband Service would also support mission critical communications by hospitals, and the flexibility that comes with this model would also facilitate the accelerated deployment of these services, as well as other mission critical services such as utility applications. As such, it is appropriate and consistent with the Commission's authority to adopt a licensed by rule licensing model for the 3.5 GHz Band.

B. An Incumbent Access tier should be established in a way that promotes wide ranging commercial access to the band while protecting incumbent Federal radar systems and non-Federal fixed satellite systems.

With regard to the Incumbent Access tier, the Associations agree that the ultimate success of shared use of the 3.5 GHz Band depends on providing wide ranging commercial access to the band for Citizens Broadband Service applications while ensuring that current users of the band continue to be protected from harmful interference. That can be accomplished through spectrum sharing interference mitigation techniques, including the implementation of the SAS. Moreover,

[26] *Id.* at ¶63.

and as described more fully below, the Associations agree with the Commission's assessment that the underlying assumptions behind NTIA's interference protection recommendations, including the exclusion zone, may be altered by the Commission's proposal to authorize the 3.5 GHz Band for use by small cell, low power, low site operations instead of the relatively high power, high-site WiMax operations that NTIA was modeling.[27] Reducing the exclusion zones will be critical for the effective use of the 3.5 GHz Band around coastal areas, considering that NTIA's exclusion zones would preclude operations to approximately 60 percent of the United States population.[28]

C. A Priority Access tier should be established in the lower half of the 3.5 GHz Band to support mission critical communications by utilities and other critical infrastructure users that require priority access for communications during emergencies.

With regard to the Priority Access tier, the Associations believe that a Priority Access tier should be implemented, and the appropriate scope should include utility and other critical infrastructure communications.[29] Further, the Associations believe that Priority Access users would be able to achieve a meaningful level of service in areas where Priority Access is authorized, given the restrictions that the Commission has proposed to protect Incumbent Access tier users.[30] The Associations also believe that Incumbent Access tier users would be protected from interference from Priority Access tier users, because small cells have relatively short range compared to radar and fixed satellite operations in the band.[31] In short, there is a greater

[27] *Id.* at ¶¶67-68.

[28] *Id.* at ¶67.

[29] *Id.* at ¶71.

[30] *Id.*

[31] *Id.*

potential for interference *to* Priority Access than *from* it. The SAS should be able to address the potential for interference to or from Priority Access tier users on a dynamic basis, if the appropriate information is provided to SAS and the equipment is capable of spectrum sensing.[32] The Associations do not believe that Priority Access tier operations will be primarily used for indoor operations, and opposes any regulations that would restrict Priority Access to indoor use only.[33]

With regard to eligibility, the Associations agree with the Commission's suggestion that eligible users "could include hospitals, utilities, state and local governments, and/or other users with a distinct need for reliable, prioritized access to broadband spectrum at specific, localized of facilities."[34] The Associations also support the Commission's proposal to limit eligibility for inclusion in the Priority Access tier to these kinds of critical uses."[35] The Associations believe that the Priority Access tier would be viable, because there would be a sufficient number of users to drive economies of scale in equipment supply.[36] By defining the scope of eligibility to include critical use facilities as illustrated by the Commission, the class of critical facilities could be sufficiently large to create the economies of scale to make the Priority Access tier viable without

[32] *Id.*

[33] *But see Id.* at ¶72 (stating that "[d]ue to the propagation characteristics of the 3.5 GHz Band and the relatively low power levels we propose, we anticipate that Priority Access users would operate primarily indoors, though it may be possible to extend the construct to outdoor deployments.") *But see Id*. at ¶150 (asking a variety of questions regarding possible limitations on outdoor use of 3.5 GHz small cells).

[34] *Id*. at ¶9. UTC notes that the Commission is currently proposing to expand eligibility for the 4.9 GHz band to include "critical infrastructure industry" entities on a primary basis. The term "critical infrastructure industry" is defined at Section 90.7 of the Commission's Rules to include, "State, local government, and non-government entities, including utilities, railroads, metropolitan transit systems, pipelines, private ambulances, volunteer fire departments, and non-for-profit organizations that offer emergency road services providing private internal radio services provided these private internal radio services are used to protect safety of life, health or property, and are not made commercially available to the public."

[35] *Id.* at ¶73.

[36] *Id.*

making the class of facilities so large that communications quality of service might be jeopardized by congestion and interference among Priority Access tier users.[37]

With regard to the band plan, as more fully described below in response to the technical questions posed in the NPRM, the Associations believe that the lower half of the 3.5 GHz Band should be made available for Priority Access use on a nationwide basis, but that 3.5 GHz devices should be able to select frequencies dynamically within that band using the SAS on a location-by-location basis.[38] The Associations do not believe that the entire 100 MHz of spectrum should be divided into channels and made available that way, either on a static or dynamic basis, for all Citizens Broadband Service users in all geographic areas.[39] That would likely lead to interference and congestion in the Priority Access tier, contrary to the tier's purpose of providing high quality communications for mission critical applications.

D. A GAA tier should be established to promote effective use of the band while ensuring that Incumbent Access tier and Priority Access tier users are protected from interference from GAA tier users.

The Associations support the Commission's proposal to include a GAA tier for a variety of consumer applications that would only operate in GAA and Priority Access zones. The Associations agree that this would make efficient use of the band and that the same equipment could be used in both the GAA and Priority Access tiers, thereby promoting economies of scale. The Associations also support the Commission's proposals to protect against interference from GAA operations to Priority Access tier and Incumbent Access tier operations. Specifically, the

[37] Id. (asking for comment on the viability of the Priority Access tier and the ideal scope of the eligible class of users.)

[38] *See Id.* at ¶74 (requesting comment on the band plan and "whether the specific frequencies available for Priority Access use should be set by rule to be consistent on a nationwide basis or should be set dynamically in the SAS on a location-by-location basis.")

[39] *Id.* (asking for comment on various issues, including dividing the 3.5 GHz Band into channels and making them available on either a static or dynamic basis to all users in all geographic areas.)

Commission should ensure that GAA users incorporate interference mitigation capabilities in their equipment, as well as require them to register with the SAS database. Further, the Commission is correct in its approach that (in addition to protecting Priority Access and Incumbent Access tier users as outlined above) not to provide GAA with any expectation of interference protection from either Priority Access tier or Incumbent Access tier operations. Finally, the Associations support allowing GAA users to use at least 50 MHz of the 3.5 GHz Band in Priority Access zones (depending on whether Priority Access services are in active use or not at a given location).[40] The Associations believe that spectrally separating GAA from Priority Access operations by segmenting the band in Priority Access zones would help to guard against congestion as well as interference.[41] If the Commission allows GAA users to use 100% of the 3.5 GHz Band in Priority Access zones in areas where there are no active Priority Access services, the Commission should clarify that GAA must return to the 50% of the spectrum that is allocated for GAA use in Priority Access zones when Priority Access use commences in that area. There can be no expectation of squatter's rights by GAA users in Priority Access zones.

IV. Supplemental Proposal to Include the 3650-3700 MHz Band

In the NPRM, the Commission seeks comment on the potential inclusion of the 3650-3700 MHz band into the proposed regulatory regime for the 3.5 GHz band. [42] The Commission notes that 3.65 GHz operations provide "a variety of important services to utility companies,

[40] *Id.* at ¶76.

[41] *Id.* UTC believes that there may be situations where Priority Access users seek Commission authority to operate in GAA zones. In those cases, UTC would recommend that the Commission should only permit GAA operations to use the same 50 MHz that they would use in Priority Access zones. This would help to protect against interference from GAA operations to operations by Priority Access users in GAA zones.

[42] *Id.* at ¶77.

public safety entities, businesses, and consumers."[43] The Commission rightly asserts that "[t]his proceeding presents us with the opportunity to create a 150 megahertz contiguous block of spectrum that could be used by existing licensees in the 3650-3700 MHz band, as well as new licensees, to expand the services that they are already providing."[44] As a technical matter, the Commission proposes that "current 3650-3700 MHz licensees be permitted to operate within Higher Power Operation Zones at maximum power levels that mirror the current maximum power levels in the 3650-3700 MHz Band, subject to control by the SAS." Further, "Higher Power Operation Zones would be subsets of Priority Access Zones wherein the Citizens Broadband Service users would be permitted to operate at these power levels on a GAA basis."[45]

The Associations support the proposal to include the 3.65 GHz Band into the regulatory regime for the 3.5 GHz Band. Utilities and other critical infrastructure industries use the 3.65 GHz band for advanced metering applications and would potentially benefit by having greater licensing flexibility and greater capacity.[46] Utilities have encountered challenges finding available spectrum in parts of the 3.65 GHz band. Opening up the 3.5 GHz Band would alleviate some of those constraints, and drive economies of scale into equipment for both bands. In addition, combining the 3.65 GHz with the 3.5 GHz Band presents an opportunity to clean up the database of licenses that are currently registered in the 3.65 GHz band and incorporate that data into the SAS. There are some operations that have not properly registered with the database and there are also some licensees that have registered but are not in operation. Thus, these are just

[43] *Id.* at ¶77.

[44] *Id*. at ¶78.

[45] *Id.*

[46] Utilities would have more spectrum from which to choose available channels and could potentially gain greater capacity by virtue of the additional spectrum that would be available.

some of the variety of benefits that could result from combining the 3.65 GHz band with the 3.5 GHz Band.

The Associations have concerns about the technical rules for such operations. How will these higher power operations in the Priority Access zones affect lower power Citizens Broadband Services? The Commission states that such operations would be on a GAA basis, but does that mean these operations would be only permitted in the GAA spectrum? The Associations believe that it would be appropriate to restrict some of these higher power operations to operations only in the GAA spectrum in the 3.5 GHz Band. However, utilities and other critical infrastructure industry entities that are migrating into the 3.5 GHz Band may have an interest in using the Priority Access tier of spectrum at 3.5 GHz, instead of having to contend with GAA users in the GAA spectrum. By the same token, utilities and other critical infrastructure industry entities would be concerned about potential interference and congestion to Priority Access tier operations, if the GAA users were able to license their higher power operations in the Priority Access tier segment of the 3.5 GHz Band. The Associations urge the Commission to carefully consider this issue as it works through the details of the migration of 3.65 GHz operations into the 3.5 GHz Band.

V. Alternative Licensing and Spectrum Access Models

The Commission invites comment on alternative licensing and spectrum access models, including a two-tiered approach, a geographic licensing approach (including a hybrid approach for indoor and outdoor use), and other options such as a lightly-licensed model and a Part 15 approach under a three-tier structure. Specifically, the Commission invites comment on the costs and benefits of these various approaches relative to its proposed multi-tiered approach using a licensed by rule model.

Considering the alternatives, the Associations believe that the proposed approach is the best path forward. A two-tiered approach would provide greater capacity for Priority Access tier users, including utilities and other critical infrastructure industries (assuming they are made eligible in the Priority Access tier) and is attractive from that perspective. However, the benefits of a two-tiered approach would likely be outweighed by the costs. Economies of scale may be lost by adopting a two-tiered approach that prevents the spectrum from being used by GAA users. Spectrum efficiency could be reduced to the extent that Priority Access users by themselves to do not make sufficient use of the spectrum. Similarly, a geographic area approach could provide more regulatory certainty against interference and congestion, but it would likely create more costs and delays in the process. Further, the geographic area licensing model would present a potential conflict with the auction-exemption provisions of the Communications Act for "public safety radio services". It is likely that utilities, pipelines and railroads will become licensees in the 3.5 GHz Band, such that if they represented the predominant use of the band, the spectrum would be auction-exempt under the Commission's rules. Finally, other options such as lightly-licensed and Part 15 have their drawbacks as well as some advantages. But, the multi-tiered, licensed-by-rule approach proposed by the Commission provides all of the benefits (including economies of scale, low administrative burden, and a unified licensing model) and few if any of the drawbacks associated with the other options under consideration.

VI. Allocation

The Commission proposes to retain the primary allocation for existing DoD radar systems, and to allocate the 3.5 GHz Band for non-federal Fixed and Mobile use. It seeks comment on how it should allocate the 3.5 GHz Band to Fixed and Mobile Services, specifically with regard to Section 303(y) of the Communications Act regarding flexible use. The

Commission explains that Section 303(y) authorizes flexible use where (1) the allocation is in the public interest; (2) the allocation does not deter investment in communications services, systems, or development of technologies; and (3) such use would not result in harmful interference among users.

The Associations support the Commission's proposal to allocate the 3.5 GHz Band for non-federal Fixed and Mobile use. As the Commission notes, such non-federal Fixed and Mobile allocation is consistent with international allocations for use of the 3.5 GHz Band, and it would spur innovation and investment in new wireless technologies, with little to no impact on incumbent uses, including DoD radar systems that would be primary in the band. Finally, the Commission's rules would prevent interference between users of the band through the SAS and technical and operational rules it has proposed. In that regard, the Associations support the Commission's proposal to restrict primary FSS earth station use to the FSS earth stations licensed or applied for as of the effective date of the Report and Order in this proceeding, which is similar to the grandfathering provisions that apply in the 3.65 GHz band in that existing facilities would be primary while new or modified facilities would be secondary.[47]

VII. Technical Proposals

A. The SAS database should require licensees to register their geolocation information and the information on the database should be kept confidential and classified.

The Commission proposes to create a spectrum access system (SAS) database to coordinate operations in the 3.5 GHz Band. Like the TV whitespace (TVWS) database, licensees would be required to register with the SAS as a condition for operations. Specifically, the Commission invites comment on whether to use the SAS; what kind of information to

[47] The Commission also invites comment on coordination issues with use of the 3.5 GHz band in Canada and Mexico. UTC does not take any position at this time on that issue.

include in it; and the viability of the database, considering the costs and benefits of 100 MHz of spectrum that are being made available in the 3.5 GHz Band. In that regard, the Commission invites comment on requiring licensees to provide geolocation information in order to enable the database to recommend right channels to avoid interference to existing radar and satellite, as well as among tiers of users. The Commission asks related questions about the design criteria for the database, as well as who should administer it and how compliance could be enforced by embedding a shutdown capability when interference occurs. Finally, the Commission invites comment on the disclosure of information on the SAS and whether certain information should be treated as classified or proprietary.

Beyond the fundamental issues associated with the SAS, the Commission invites comment on other operational issues associated with the database, including the requirement for licensees to submit geolocation information, as well as the security and transparency of the information that is in the database and that is transmitted to devices, including whether it should be made available to the public. Finally, the Commission invites comment on other issues, such as whether the 3.5 GHz Band could serve as a model for sharing in other bands, and how the database can evolve with technology and adapt to accommodate additional frequency bands and access protocols over time.

The Associations support the requirement for licensees to register their geolocation information into the SAS database. This is necessary to coordinate operations in real-time and to prevent interference, particularly here where communications will be used for mission critical operations that are intolerant of interference. Further, given that some of the information in the database will be classified and proprietary (including information submitted by utilities and other critical infrastructure industries), the Associations support protecting the information on the

database from public disclosure and providing a role for government in the administration of the database. The use of third party administrators should not necessarily be precluded by virtue of the government's role in the database.[48] Done properly, the Associations believe that the SAS could serve as a model for use in other bands and can be designed so that it can evolve with technology and adapt to additional frequency bands and access protocols over time.

B. Protection of Incumbent Access tier users should not unnecessarily preclude use of the 3.5 GHz Band by Priority Access tier users.

The Commission invites comment on the particular technologies and methodologies to protect commercial small cell wireless broadband systems from in-band interference from high-power radar systems. It notes that the NTIA recommended as part of the Fast Track report that incumbent radar systems should be protected in the worst case by a 450 km coastal area separation zone, assuming an I/N ratio of -6 dB to protect radar systems and assuming that the band would be used for high-power, high-site WiMAX mobile broadband.[49] Regarding interference from radars to commercial wireless broadband systems, the Fast Track Report calculates exclusion zone distances based on I/N thresholds between -6 dB and +10 dB, and it specifically states "digital receivers are relatively robust in the presence of low duty cycle pulsed interference."[50] The Commission concludes that "our proposed spectrum management model assumes that the calculation of Incumbent Use Zones should be designed to prevent commercial interference into radar, not interference from DoD radar into commercial systems," and it seeks

[48] For example, UTC is the administrator of the PLC database, and it maintains a security clearance in order to interface with NTIA in the management and coordination of PLC facilities with Federal government operations in the 9-490 kHz band.

[49] Specifically, the NTIA report recommends an exclusion zone of 45-310 km to protect shipborne receivers; 1-32 km to protect ground based radar; and no exclusion zone to protect airborne receivers.

[50] *NPRM* at ¶117.

comment on that conclusion.[51] The Commission believes low power, low site small cells will require considerably less geographic separation than recommended in the Fast Track report in order to protect incumbent Federal radar systems, and it invites input into small cell characteristics that would alter some of the fundamental assumptions that went into the NTIA's model. Finally, the Commission invites comments on how to protect incumbent fixed satellite services,[52] including small cell receiver characteristics and work that has been conducted by the Technical Advisory Committee (TAC) on the issue of receiver standards.

While the Associations defer to other comments on the specific technical data concerning the amount of separation distance that would be required to protect incumbent Federal radar and non-federal fixed satellite services in the band, they agree with the Commission that the amount should be substantially less than what is recommended by the NTIA Fast Track report. In addition, the Associations agree with the Commission that the digital receivers that will be used for small cells should be sufficiently robust and resilient to mitigate against the interference from Incumbent Access tier devices to the GAA or Priority Access tier devices. As such, the Associations support the Commission's efforts to limit the exclusion zones to the distances appropriate under the circumstances to protect incumbents from interference and to protect Priority Access tier operations from interference form incumbents. This will be essential for the successful utilization of the 3.5 GHz Band by GAA and Priority Access tier users. Conversely, if the exclusion zones are too great, it would diminish the size of the potential market, thus reducing the economies of scale that would be otherwise achieved by GAA and Priority Access tier operations in the 3.5 GHz Band.

[51] *Id.*

[52] As a reference point, the Commission notes that there is a 150 km separation distance requirement to protect FSS in the 3.65 GHz band. It should be noted however that the 3.65 GHz operations are substantially greater power than what is generally proposed by the Commission for the 3.5 GHz band. As such, UTC believes that the distance separation criteria necessary to protect FSS operations should be substantially less than 150 km.

C. Commission Rules for small cell technical characteristics should promote the use of the band for fixed applications, such as smart grid, as well as for mobile applications.

The Commission proposes a fixed station transmit power limit of 200 mW (23 dBm) for small cell CBS devices in the 3.5 GHz Band. The Commission also seeks comment on its proposal for a 7 dBi antenna gain for any installation requiring an external antenna. Alternatively, the Commission invites comment on whether it should establish a maximum EIRP for power and not set a requirement for antenna gain. It also asks whether it should establish a different transmit power (or EIRP) for indoor operations and outdoor operations; and whether, in a small cell context, mobile stations should have different technical limits than base stations and if so, what these limits should be. Finally, the Commission seeks comment on whether it should include a maximum outdoor base station antenna height above the average terrain and what limitations are appropriate and feasible. In addition, it asks what the minimum emission bandwidth and maximum emission bandwidth should be for small cells.[53]

The Associations again defer on the specific limits that should be applied to small cell operations in the 3.5 GHz Band. However, it emphasizes that the Commission should recognize that utilities will likely use this band for a variety of fixed operations, such as smart grid, as well as mobile applications. As such, issues such as antenna gain and height are important for those operations. Therefore, the Commission should provide rules for those small cell characteristics and installations.

D. The Out of band and spurious emission limits should be consistent with 3.65 GHz equipment to promote the transition of operations from 3.65 into the 3.5 GHz Band.

Commission invites comment on the appropriate out of band emission limits in order to protect adjacent operations below and above the 3.5 GHz Band. Specifically, the Commission

[53] *Id.* at ¶131.

notes that there are three main adjacent operations that should be considered in evaluation of OOBE, including radar operations at 3500-3650 MHz, FSS earth stations that receive satellite signals at 3600-4200 MHz, and wireless broadband services that operate in the 3650-3700 MHz band.

The Commission notes that the OOBE limit for the 3.65 GHz band equipment is 43+10log P dB, and the Associations support the adoption of this OOBE limit for use in the 3.5 GHz Band. This OOBE has been effective at protecting against adjacent channel interference in the 3.65 GHz Band, and adopting it in the 3.5 GHz Band would facilitate the transition of devices and operations in the 3.65 GHz band into the 3.5 GHz Band.

E. 3.5 GHz equipment should be FCC authorized, and include flexible and resilient technologies to mitigate against potential interference from high-powered radar systems.

The Associations support the Commission's proposal to require that all 3.5 GHz Band devices be authorized by the Commission, and they believe that all devices should be subject to testing. Further, the Associations support the Commission's proposal to incorporate flexible and resilient technologies into 3.5 GHz Band devices in order to protect front end receivers from high-powered radar in the band.[54]

F. Existing RF exposure limits should apply, but environmental compliance requirements should be streamlined.

The Associations support the Commission's proposal to apply the existing RF exposure limits for 3.5 GHz small cell devices. This will promote regulatory certainty and consumer confidence. Certain devices are categorically exempt from the RF exposure limits, and small cell devices may fall within that category, depending on the rules that the Commission ultimately adopts for small cell maximum output power in the 3.5 GHz Band. In any event, the

[54] UTC defers on the appropriate max peak input power and C/I levels.

Commission need not develop specific rules for RF exposure limits for 3.5 GHz Band small cell devices.

The Associations agree with the Commission that environmental compliance requirements should be streamlined for 3.5 GHz small cell devices, because they are less likely to impact the environment or historic places compared to other antenna structures and the environmental compliance requirements could impose undue administrative burdens on the deployment of small cell devices. The deployment of 3.5 GHz devices could be unreasonably delayed due to the sheer number of small cells that will be required for coverage and which would be subject to environmental compliance requirements. Therefore, the Commission should streamline the environmental rules for 3.5 GHz small cell devices in order to accelerate deployment of these relatively unobtrusive devices.

G. Band Segmentation

The Associations support the Commission's proposal to allocate 50% of the 3.5 GHz Band for the Priority Access tier, and they recommend that the Commission allocate the 3550-3600 MHz band for the Priority Access tier. As the Commission notes, there are no FSS earth station in this band, which may militate for relief from protections that would otherwise apply in other parts of the band. The Associations also believe that if the Commission divides the upper and lower half of the band that different rules should apply. While band segmentation may not be the most efficient means of dividing the available spectrum, as a practical matter it is necessary here in order to protect against interference between the Priority Access tier and the GAA tier in the 3.5 GHz Band. While there may be alternative approaches, the Commission's proposal makes the most sense on balance.

VIII. CONCLUSION

WHEREFORE, the premises considered, the Associations respectfully requests that the Commission act as requested herein. Specifically, the Commission should expand eligibility to include critical infrastructure industry entities, including utilities, in the Priority Access tier of the 3.5 GHz Band. It should also develop exclusion zones based upon the limited interference potential that small cells represent to incumbent radar and FSS in the band, recognizing that Priority Access and GAA tiers need to be able to operate near the coastal areas where 60% of the population of the United States lives. The Commission should combine the 3.65 GHz and 3.5 GHz bands together to provide 150 MHz of capacity for small cell spectrum sharing, and it should ensure that 3.65 GHz high power operations do not cause interference to Priority Access tier operations in the 3.5 GHz Band. Finally, the Commission should develop technical rules and equipment requirements to enable dynamic frequency selection capabilities for spectrum sharing and to protect against interference from co-and adjacent channel operations in the band.

Respectfully submitted,

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